World Academy of Science, Engineering and Technology
International Journal of Cognitive and Language Sciences
Vol:11, No:07, 2017

Investigation of Possible Behavioural and Molecular Effects of Mobile Phone Exposure on Rats

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Abstract : The N-methyl-D-aspartate (NMDA)-dependent pathway is the major intracellular signaling pathway implemented in both short- and long-term memory formation in the hippocampus which is the most studied brain structure because of its well documented role in learning and memory. However, little is known about the effects of RF-EMR exposure on NMDA receptor signaling pathway including activation of protein kinases, notably Ca²⁺/calmodulin-dependent protein kinase II alpha (CaMKIIα). The aim of the present study was to investigate the effects of acute and chronic 900 MHz RF-EMR exposure on both passive avoidance behaviour and hippocampal levels of CaMKIIα and its phosphorylated form (pCaMKIIα). Rats were divided into the following groups: Sham rats, and rats exposed to 900 MHz RF-EMR for 2 h/day for 1 week (acute group) or 10 weeks (chronic group), respectively. Passive avoidance task was used as a behavioural method. The hippocampal levels of selected kinases were measured using Western Blotting technique. The results of passive avoidance task showed that both acute and chronic exposure to 900 MHz RF-EMR can impair passive avoidance behaviour with minor effects on chronic group of rats. The analysis of western blot data of selected protein kinases demonstrated that hippocampal levels of CaMKIIα and pCaMKIIα were significantly higher in chronic group of rats as compared to acute groups. Taken together, these findings demonstrated that different duration times (1 week vs 10 weeks) of 900 MHz RF-EMR exposure have different effects on both passive avoidance behaviour of rats and hippocampal levels of selected protein kinases.

Keywords : hippocampus, protein kinase, rat, RF-EMR
Conference Title : ICAACEN 2017 : International Conference on Applications of Cognitive Engineering and Neuroscience
Conference Location : Prague, Czechia
Conference Dates : July 09-10, 2017